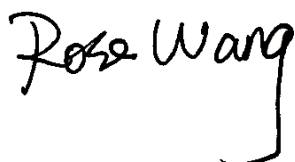


RF Exposure Evaluation Report

APPLICANT : Casa Systems, Inc.
EQUIPMENT : Apex Enterprise Femto cell (E-Femto)
(B4/B13/B66 with LAA)
BRAND NAME : APEX 4G LTE Femto for Enterprose (eFemto)
MODEL NAME : LTE-2004-04
FCC ID : 2AO38LTE2004-04
STANDARD : 47 CFR Part 2.1091
FCC KDB 447498 D01 v06

We, Sporton International (Kunshan) Inc., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and pass the limit. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.



Reviewed by: Rose Wang / Supervisor



Approved by: Kat Yin / Manager



Sporton International (Kunshan) Inc.

**No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China**



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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA082710	Rev. 01	Initial issue of report.	Nov. 23, 2020



1. Administration Data

1.1. Testing Laboratory

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory		
Test Firm	Sporton International (Kunshan) Inc.	
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958	
Test Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CN1257	314309

Applicant	
Company Name	Casa Systems, Inc.
Address	100 Old River Road Suite 100 Andover, Massachusetts 01810 United States

Manufacturer	
Company Name	Casa Systems, Inc.
Address	100 Old River Road Suite 100 Andover, Massachusetts 01810 United States

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Apex Enterprise Femto cell (E-Femto) (B4/B13/B66 with LAA)
Brand Name	APEX 4G LTE Femto for Enterprose (eFemto)
Model Name	LTE-2004-04
FCC ID	2AO38LTE2004-04
Tx Frequency	LTE Band 4 : 2112.5 MHz ~ 2152.5 MHz LTE Band 13 : 748.5 MHz ~ 753.5 MHz LTE Band 66 : 2112.5 MHz~ 2177.5 MHz LTE Band 46: 5150 MHz ~ 5250 MHz, 5725 MHz ~ 5850 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz
Rx Frequency	LTE Band 4 : 1712.5 MHz ~ 1752.5 MHz LTE Band 13 : 779.5 MHz ~ 784.5 MHz LTE Band 66 : 1712.5 MHz ~ 1777.5 MHz LTE Band 46: 5150 MHz ~ 5250 MHz, 5725 MHz ~ 5850 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz
Mode	LTE: QPSK, 16QAM, 64QAM WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80
WWAN Antenna Gain	SISO Ant. 1/2: LTE Band 4 : 1.0 dBi LTE Band 13 : 1.0 dBi LTE Band 66 : 1.0 dBi LTE Band 46: 6.0 dBi MIMO Ant. 1+2: LTE Band 4 : 4.01 dBi LTE Band 13 : 4.01 dBi LTE Band 66 : 4.01 dBi LTE Band 46 : 6.0 dBi
WLAN Antenna Gain	WLAN 5.2GHz: gain 6 dBi WLAN 5.8GHz: gain 6 dBi
Antenna Type	WWAN : PIFA Antenna WLAN : Dipole Antenna
HW Version	V01
SW Version	V01
EUT Stage	Identical Prototype

Remark:

- The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
- MIMO Gain = SISO Gain + Array Gain($10\log 2$) for LTE band 4/13/66
- LTE band 46 MIMO gain is the same as SISO mode for MIMO only support SDM (spatial division multiplexing) mode.

Comments and Explanations:

- The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.
- The maximum RF output tune up power, antenna gain also the safe distance used for evaluate RF exposure were declared by manufacturer.

3. Maximum RF Tune Up power among production units

<LTE>

Mode		Maximum Average power(dBm)		
		Ant 1	Ant 2	MIMO
LTE	Band 4	23.00	23.00	26.00
	Band 13	22.00	22.00	25.00
	Band66	23.00	23.00	26.00

Mode			Maximum Average power(dBm)		
			Ant 1	Ant 2	MIMO
LTE Band 46	5.2GHz	20MHz	24.00	24.00	27.00
		40MHz	18.00	18.00	21.00
	5.8GHz	20MHz	26.00	26.00	29.00
		40MHz	23.00	23.00	26.00

<5GHz WLAN >

Mode		Maximum Average Power (dBm)
5.2GHz	802.11a	23.50
	802.11n-HT20	23.50
	802.11n-HT40	24.00
	802.11ac-VHT20	23.50
	802.11ac-VHT40	24.00
	802.11ac-VHT80	21.50
5.8GHz	802.11a	27.00
	802.11n-HT20	27.50
	802.11n-HT40	28.00
	802.11ac-VHT20	27.50
	802.11ac-VHT40	28.00
	802.11ac-VHT80	27.50

4. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at **20 cm** to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna



5. Radio Frequency Radiation Exposure Evaluation

5.1. Standalone Power Density Calculation

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)
LTE Band 4	2112.50	4.01	26.00	30.010	1.002	1002.305	0.200	1.000
LTE Band 13	748.50	4.01	25.00	29.010	0.796	796.159	0.158	0.499
LTE Band 46	5150.00	6.00	29.00	35.000	3.162	3162.278	0.629	1.000
LTE Band 66	2112.50	4.01	26.00	30.010	1.002	1002.305	0.200	1.000
5.2GHz WLAN	5180.0	6.00	24.00	30.000	1.000	1000.000	0.199	1.000
5.8GHz WLAN	5745.0	6.00	28.00	34.000	2.512	2511.886	0.500	1.000

Note:

1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. Chose the maximum power density to do MPE analysis.
3. WWVAN can't transmit with WLAN simultaneously.

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.

-----THE END-----